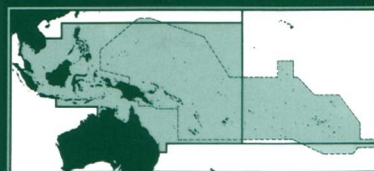




FAO SPECIES IDENTIFICATION GUIDE FOR FISHERY PURPOSES

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THE LIVING MARINE RESOURCES OF THE  
**WESTERN CENTRAL  
PACIFIC**



Volume 1. Seaweeds, corals, bivalves and gastropods



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**FAO SPECIES IDENTIFICATION GUIDE FOR FISHERY PURPOSES**

**THE LIVING MARINE RESOURCES OF THE  
WESTERN CENTRAL PACIFIC**

**VOLUME 1**

**Seaweeds, corals, bivalves and gastropods**

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with the support of the

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#### **SUMMARY**

This multivolume field guide covers the species of interest to fisheries of the major marine resource groups exploited in the Western Central Pacific. The area of coverage includes FAO Fishing Area 71 and the southwestern portion of Fishing Area 77 corresponding to the South Pacific Commission mandate area. The marine resource groups included are seaweeds, corals, bivalves, gastropods, cephalopods, stomatopods, shrimps, lobsters, crabs, holothurians, sharks, batoid fishes, chimaeras, bony fishes, estuarine crocodiles, sea turtles, sea snakes, and marine mammals. The introductory chapter outlines the environmental, ecological, and biogeographical factors influencing the marine biota, and the basic components of the fisheries in the Western Central Pacific. Within the field guide, the sections on the resource groups are arranged phylogenetically according to higher taxonomic levels such as class, order, and family. Each resource group is introduced by general remarks on the group, an illustrated section on technical terms and measurements, and a key or guide to orders or families. Each family generally has an account summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a checklist of species, and a short list of relevant literature. Families that are less important to fisheries include an abbreviated family account and no detailed species information. Species in the important families are treated in detail (arranged alphabetically by genus and species) and include the species name, frequent synonyms and names of similar species, an illustration, FAO common name(s), diagnostic characters, biology and fisheries information, notes on geographical distribution, and a distribution map. For less important species, abbreviated accounts are used. Generally, this includes the species name, FAO common name(s), an illustration, a distribution map, and notes on biology, fisheries, and distribution. Each volume concludes with its own index of scientific and common names.

## Editorial Notes

### Geographical Limits and the Phrase “Western Central Pacific”

The terms Indo-West Pacific, western Pacific, and Central Pacific have had a variety of different meanings attached to them. Most authors in these volumes have used the term Indo-West Pacific in the sense defined by Sven Ekman in his 1953 book on “Zoogeography of the Sea”. Therefore, **Indo-West Pacific** refers to the warm water fauna of the entire Indian Ocean and associated seas, and the tropical and subtropical fauna of the western and central Pacific Ocean. This biogeographical unit is distinguished from the eastern Pacific which is the distinct fauna along the coast of the Americas. It is separated from the West and Central Pacific by the vast stretch of open ocean between Polynesia and the Americas. The term **Central Pacific** is now often used to describe the islands on the Pacific Plate. The **western Pacific** now mostly describes the area of Southeast Asia east of the Andaman Sea, northern and eastern Australia and the Pacific islands on the Philippine and Indo-Australian Plates. The area covered in these volumes is defined largely on the basis of economically defined units. These include the FAO Fishing Area 71 which is based on both biogeographical and political considerations, and the area covered by the economic cooperative of the South Pacific Commission. This includes all of the tropical and part of the subtropical biogeographical unit of the western and Central Pacific, or “West Pacific” in the sense of Ekman, without the Hawaiian Islands. We use the term **Western Central Pacific (WCP)** as a convenient shorthand to describe this nearly complete coverage of the warm water fauna of the western and Central Pacific. The biogeography of this area is discussed in more detail in the introductory chapter.

### Project Institutional Affiliations

This identification guide was prepared under the direction of the Species Identification and Data Programme (SIDP) of the Marine Resources Service, Fishery Resources Division, Fisheries Department, Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Project support came from the South Pacific Forum Fisheries Agency (FFA), Honiara; and the Norwegian Agency for International Development (NORAD) through the Norwegian Programme of the Institute of Marine Research, Bergen, Norway. Partial support for the Senior Editor came from Old Dominion University, Norfolk, USA.

### Objectives

The purpose of this guide is to provide an accurate means to identify to the appropriate taxonomic level those organisms that are of potential use or likely to be captured by marine fisheries in the region. Correct identification is of utmost importance in marine resource management. The quality of fisheries statistics depends on the ability to correctly assign landing and catch data to taxon-specific categories. The species name is the link to all relevant biological and ecological information in the literature. This information is fundamental in any attempt to manage a fishery. Correct identification is also important for those scientists gathering biological data relevant to marine resource management. The fishery manager cannot confidently use the relevant biological data if the scientist collecting this information did not have an accurate means of identifying the species to begin with. Therefore, this identification tool will benefit fisheries workers gathering catch statistics and resource assessment information, and marine biologists researching information pertinent to resource management. This is particularly important for the WCP area because it encompasses the highest diversity of marine organisms exploited by fisheries than anywhere in the world. This work is the first attempt to provide comprehensive identification and biological information for marine resources in the region.

An additional objective of this guide is to document whenever possible the extent of the biodiversity likely to be affected by fisheries. Many of the questions regarding exploitation of resources are linked to issues of biodiversity because of potential adverse environmental effects of fisheries. Therefore, in important groups where it is feasible, as in the finfishes, an attempt has been made to list all species present in all families recorded from the WCP area.

### History of the Project

In 1974, Walter Fischer, the founder and senior editor of the SIDP, produced the *FAO Species Identification Sheets for Fishery Purposes. Eastern Indian Ocean Fishing Area 57 and Western Central Pacific Fishing Area 71*. This was the second in the “Species Identification Sheet” series, following one published for the Mediterranean and Black Seas in 1972. Both these publications were important compilations of the state of the art knowledge of the taxonomy of the major groups of marine organisms exploited by fisheries. Both paved the way for later editions including the present work and the 1987 *Fiches FAO d'Identification des Espèces pour les Besoins de la Pêche (Révision 1). Méditerranée et Mer Noire*.

Major advances in our taxonomic knowledge have been made in virtually all groups covered by the early 1970's FAO Identification Sheets series. This fact was recognized by most researchers in the Western Central Pacific (WCP) in the early 1990's and in particular, by Andrew Wright of the FFA. At the time, he was editing the book *Nearshore Marine Resources of the South Pacific* and recognized the importance of updating an identification tool for fisheries workers in the WCP. His enthusiasm and commitment through support from the FFA created the momentum needed to initiate this project. The motivation of Gabriella Bianchi of the Institute of Marine Research in Bergen, provided the additional support through NORAD needed to complete the first draft of this document.

The first FAO Identification Sheets covering the WCP and a similar guide covering the Western Indian Ocean were preceded by workshops. These were attended by authors and the purpose was to facilitate completion of the manuscripts through examination of specimens accumulated for the workshops. This approach was helpful in improving the quality of the manuscripts because of the tremendous diversity in the Indo-West Pacific and the need to collect additional data on specimens from the region.

A similar workshop was considered vital to support preparation of this guide. Authors were first requested to complete a draft of their family and species accounts. These were then tested and edited in 1995 at a workshop held in the Philippines from October 1 to 10. Thirty-eight authors and around 20 local and international fisheries workers attended the workshop. The Philippines was chosen because of the very high diversity of marine organisms found in markets there. The workshop was held at the Marine Science Institute (MSI) of the University of the Philippines which is under the direction of Dr Edgardo Gomez. Both the main campus MSI facilities at Diliman, Quezon City and at Bolinao, Pangasinan were utilized during the workshop. Marine organisms were collected at several sites around the Philippines prior to the workshop and at markets and landings near the MSI facilities during the workshop. These specimens were used to gather relevant taxonomic information and were used in testing the identification keys in the manuscripts. In addition, authors attending the workshop were asked to read a certain number of manuscripts for editorial and peer review purposes. The ICLARM (International Center for Living Aquatic Resources Management) FISHBASE database project, under the direction of Dr Rainer Froese, was instrumental in administering the workshop. Ms Emily Capuli of the ICLARM FISHBASE team directed the logistics and administration of the workshop. In addition, the FISHBASE database was used as a reference tool by authors and editors during the workshop.

## **Identification “Sheets” versus Identification Guide**

The “Species Identification Sheet” series was initiated by the estimable Dr Walter Fischer in the early 1970's. It was originally envisioned with the capability of periodic updates through correction and substitution of removable sheets in a ring binder cover. The state of taxonomic nomenclature is consistently changing because of improvements in our knowledge, perhaps even more so in the early 70's than now. Therefore, the concept of updates through removable sheets was considered an expedient means to cope with this flux. However, with the urgent need to cover other areas in the Identification Sheet series, and the limited resources available to the SIDP, it became practically impossible to pursue periodic updates. For this reason, the ring binder format was abandoned for the 1987 revision of the Identification Sheets covering the Mediterranean and Black Seas and the name formally changed to more accurately reflect this difference in the latest identification guide for the eastern Central Pacific in 1995 (*Guía FAO para la identificación de especies para los fines de la pesca. Pacífico centro-oriental*).

## **Publications of the Species Identification and Data Programme (SIDP)**

The FAO Species Identification Guide series covers all marine resources for a major region with major species being covered on a full page with a figure, identification and biological information, and a distribution map. This is only one type of publication produced by the SIDP. Other types include the FAO Species Identification Field Guide series which covers only a single country or a sub-region. Field guides cover major species in abbreviated accounts and usually are covered with around 3 species per page. The FAO Species Catalogue series covers a single resource group worldwide with extensive species accounts when information is available. The FAO Species Synopsis series covers a single important major fisheries species with all known biological and fisheries information reviewed. In addition to these four basic kinds of SIDP publications, one ‘hybrid’ publication was produced which is a cross between an Identification Guide and a Species Catalogue. This was an FAO Species Identification Guide to the Marine Mammals of the World produced in 1994. The SIDP also produced the FAO database SPECIESDAB which includes the expert information found in the FAO Species Catalogue series for fishery purposes. This is a stand-alone database currently available through the FAO. SPECIESDAB formed the kernel that allowed the ICLARM/EC/FAO database FISHBASE to become developed.



## **FAO and other Common Names**

The great diversity of species included in these volumes posed a problem for creating a comprehensive list of common names in the three primary FAO languages: English, French, and Spanish. The great majority of the authors use English as their primary language and therefore it was not difficult to produce an FAO English common name. English is the most common international language in the WCP area and therefore of the most widespread usefulness. French is also a primary language in New Caledonia and French Polynesia and therefore we attempted to find published French names or create new ones when practical. However, the coverage of French names is still patchy and we request that users of this guide send us common French names that are being utilized. These can be included in future editions. Spanish is not commonly used in the WCP area and therefore will be of limited use. Therefore, we did not actively attempt to create Spanish common names. French and Spanish speaking users may wish to write in the respective common names directly on the pages of this guide for easy reference.

The WCP area not only contains an extreme diversity of species, but also a corresponding diversity of national and regional languages. With each of these languages comes another set of common names applied to marine organisms captured in fisheries. An attempt to list these common names is beyond the scope of these volumes. In addition, we prefer to encourage fisheries workers to adopt the FAO common names as a standard to reduce confusion in the reporting of statistics. However, it is often useful to refer to local common names, especially when dealing with local fishermen. When this is useful, we encourage fisheries workers to annotate this guide with local names on the appropriate pages, next to the figure of the relevant species.

## **The FAO Codes Previously and Currently Included in the Identification Guide Series**

Through and including the last FAO identification guides for fishery purposes, codes were always included to the right of the scientific species name. The original intention of these codes was for use in databases that relate the species name to information on biology and statistics. This code is used in the FAO database SPECIESDAB. However, since their inception, these codes have not been widely used. In addition, current databases no longer require a taxonomically-based code to make the database taxonomically relational. Current databases and hardware are fast enough to simply use the full genus and species as the relational tool. We therefore are omitting these codes in this and presumably all future FAO Species Identification Guide publications.

In contrast to the FAO SIDP species codes, the FAO 3 Alpha codes are and have been frequently used as a shorthand means of representing species and species groups for reporting statistics. We include in these volumes this code, whenever one is already in existence and reported in the 1995 FAO Yearbook of Fishery Statistics (Volume 80). These codes can be used for reporting catch and landing data to the FAO.

## **Different Levels of Taxonomic Coverage**

In addition to the great diversity of species covered in this guide, there is also a wide diversity in the extent and methods of fisheries utilization. We attempt to give more extensive coverage to those species that are more important in fisheries. However, it is also often difficult to judge how fisheries importance will change with time, and whether an organism has potential for exploitation. In addition, exploitation must be carefully weighed against ecological impacts in order to ensure sustainability. Included in this consideration is the issue of biodiversity. Ideally, this document would include a comprehensive list of all species in the groups covered so that it can also be used as a benchmark for biodiversity. However, for many of the invertebrate groups which are very speciose, the work required to compile species lists is beyond the scope of this work. However, for the vertebrate groups, comprehensive species lists were possible and are included here.

The families most important in fisheries are covered with a family section summarizing family diagnostic characters, biological and fisheries information, notes on similar families occurring in the area, a key to species, a list of species, and a short list of relevant literature. However, for certain groups such as the plants and corals, family accounts are omitted and extensive information is included only under the species accounts. Species in the important families have a single side of a page to include the species name, the FAO common name or names, an illustration, diagnostic characters, biology and fisheries information, notes on geographical distribution, and a map showing a generalized area of coverage. For less important species, abbreviated accounts are used. This includes the species name, FAO common name or names, notes on biology and distribution, an illustration, and a generalized distribution map. Families which are monotypic (contain a single species) are covered similar to important species except that frequently 2 sides of a page are used and notes on similar species occurring in the area are included. Families that are less important have a family section similar to those for important families except a key to species may or may not be included, and no detailed species pages follow.

## The Distribution Maps

The maps included for species of importance to fisheries are generalized maps with a total expected range. This masks the complexity of distribution of many species since the actual records of occurrence are not shown. However, the geographical coverage of the WCP (nearly 40% the earth's circumference) is great and space available on a page for a map limited. Any legible mark on a map of this scope will necessarily cover a large area. Also, since all points in between geographical limits are included in many maps, it gives the impression that species may also be found in inappropriate habitats. Obviously, however, a fish normally found on a coral reef is not expected to occur in the intervening open ocean indicated on the generalized map. These maps should be used to give a quick indication of the known or expected limits of geographical limits of occurrence, rather than as an absolute indication of occurrence.

## Peer Review and Citations

Each separate section written by an author or authors was reviewed by a minimum of two, and most often at least four, peer reviewers. Therefore, they can be considered peer review publications. When citing a specific taxonomic work, the author or authors should be listed first. For example:

Smith-Vaniz, W.F. 1998. Carangidae. *In* *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific*, edited by K.E. Carpenter and V.H. Niem. Rome, FAO.

When citing this work in its entirety the editors should be listed first. For example:

Carpenter, K.E. and V.H. Niem (eds). 1998. *FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific*. 6 vols. Rome, FAO.

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- Hensley, D.A., Department of Marine Sciences, University of Puerto Rico, Mayagüez, Puerto Rico 00680, USA. - **Bothidae, Citharidae, Paralichthyidae, Pleuronectidae, Psettodidae.**
- Hodgson, G., Institute for the Environment and Sustainable Development, Research Centre, Hong Kong University of Science and Technology, Clearwater Bay, Kowloon, Hong Kong, China. - **Corals.**
- Hulley, P.A., South African Museum, P.O. Box 61, 8000 Cape Town, South Africa. - **Myctophidae, Neoscopelidae.**
- Hutchins, B.J., Department of Aquatic Zoology, Western Australian Museum, Francis Street, Perth, Western Australia 6000, Australia. - **Arripidae, Enoplosidae, Gobiesocidae, Molidae, Monacanthidae.**
- Ivantsoff, W., School of Biological Sciences, Macquarie University, North Ryde, NSW 2109, Australia. - **Atherinidae, Dentatherinidae, Isonidae, Pseudomugilidae, Telmatherinidae.**
- Iwamoto, T., Department of Ichthyology, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118, USA. - **Bathygadidae, Bregmacerotidae, Macrouridae, Moridae.**
- Johnson, G.D., Division of Fishes, NHB WG 12, Smithsonian Institution, Washington, DC 20560, USA. - **Anomalopidae.**
- Kailola, P.J., 19 Walkers Avenue, Newnham, Tas 7248, Australia. - **Ariidae.**

- Kinze, C.C., SCIGTAS Institute of Marine Science, Burapha University Saen Suk, 20131 Chonburi, Thailand. - **Marine mammals.**
- Kishimoto, H., Institute of Oceanic Res. and Development, Tokai Univ., Orido, Shimizu, Shizuoka 424, Japan. - **Uranoscopidae.**
- Knapp, L.W., Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA. - **Platycephalidae.**
- Kottelat, M., Case postale 57, 2952 Cornol, Switzerland. - **Monodactylidae, Scatophagidae.**
- Larson, H.K., Museums and Art Galleries of the Northern Territory, P.O. Box 4646, Darwin, NT 0801, Australia. - **Centropomidae, Clinidae, Eleotrididae, Gobiidae, Kraemeriidae, Microdesmidae, Schindleriidae.**
- Last, P.R., CSIRO, Division of Marine Research, GPO Box 1538, Hobart, Tas 7001, Australia. - **Batoid fishes, Amarsipidae, Ariommatidae, Bramidae, Leptoscopidae, Nomeidae, Stromateidae, Tetragonuridae.**
- Leis, J.M., Section of Fishes, Division of Vertebrate Zoology, and Centre for Biodiversity and Conservation Research, Australian Museum, 6 College Street, Sydney South, NSW 2000, Australia. - **Diodontidae, Lactariidae.**
- Markle, D.F., Department of Wildlife and Fisheries, Oregon State University, Corvallis, OR 97331, USA. - **Alepocephalidae.**
- Matsuura, K., Fish Section, National Science Museum, 3-23-1 Hyakunin-cho, Shinjuku-ku, Tokyo 169, Japan. - **Balistidae, Ostraciidae, Tetraodontidae, Triacanthidae, Triacanthodidae, Triodontidae.**
- Manning, R.B., IZ-NHB 163, Smithsonian Institution, Washington, DC 20560, USA. - **Stomatopods.**
- McCosker, J.E., California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118, USA. - **Muraenidae, Ophichthidae.**
- McDowall, R.M., National Institute of Water and Atmospheric Research, P.O. Box 8602, Christchurch, New Zealand. - **Centrolophidae.**
- McGrouther, M.A., Fish Section, Australian Museum, 6 College St, Sydney NSW 2000, Australia. - **Hoplichthyidae.**
- McKay, R.J., Museum of North-Western Queensland, P.O. Box 280, Mount Isa, Qld 4825, Australia. - **Glaucosomatidae, Haemulidae, Sillaginidae.**
- Miclat, E.F.B., Marine Science Institute, University of the Philippines, U.P. P.O. Box 1, Diliman, 1101 Quezon City, Philippines. - **Marine turtles.**
- Mooi, R., Milwaukee Public Museum, 800 West Wells Street, Milwaukee, WI 53233-1478, USA. - **Chiasmodontidae, Leptobramidae, Notograptidae, Pempheridae, Plesiopidae.**
- Moore, J.A., National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543, USA. - **Ateleopodidae, Melamphaidae, Trachichthyidae.**
- Moteki, M., Laboratory of Ichthyology, Tokyo University of Fisheries, 4-5-7 Konan, Minato-ku, Tokyo 108, Japan. - **Bramidae.**
- Munroe, T.A., National Marine Fisheries Service National Systematics Laboratory, National Museum of Natural History, Washington, DC 20560-0153, USA. - **Chirocentridae, Clupeidae, Cynoglossidae, Engraulidae, Pristigasteridae, Soleidae.**
- Murdy, E.O., Division of International Programs, National Science Foundation, 4201 Wilson Boulevard, Arlington, VA 22230, USA. Present address: Tokyo Regional Office, National Science Foundation, 1-10-5, Akasaka, Minato-ku, Tokyo 107, Japan. - **Eleotrididae, Gobiidae.**
- Nakamura, I., Fisheries Research Station, Kyoto University Maizuru, Kyoto 625, Japan. - **Gempyliidae, Istiophoridae, Scombrobracridae, Trichiuridae, Xiphiidae.**
- Nelson, J.S., Department of Biological Sciences, University of Alberta, Edmonton, Alberta T6G 2E9, Canada. - **Creediidae, Percophidae, Psychrolutidae, Trichonotidae.**
- Nemeth, D., Coral World, 6450 Coki Point, St. Thomas, USVI 00802, USA. - **Champsodontidae.**
- Ng, P.K.L., School of Biological Sciences, National University of Singapore, Kent Ridge, Singapore 119260, Singapore. - **Crabs.**
- Nielsen, J.G., Zoologisk Museum, Universitetsparken 15, DK-2100 Copenhagen, Denmark. - **Aphyonidae, Bythitidae, Carapidae, Ophidiidae.**
- Niem, V.H., Marine Resources Service, Fishery Resources Division, Fisheries Department, FAO, Viale Terme di Caracalla, 00100 Rome, Italy. - **Sharks (in part), Alepisauridae, Anotopteridae, Aulopidae, Chlorophthalmidae, Evermannellidae, Giganturidae, Ipnopidae, Notosudidae, Omosudidae, Paralepididae, Scopelarchidae.**
- Nizinski, M.S., National Marine Fisheries Service National Systematics Laboratory, National Museum of Natural History, Washington, DC 20560-0153, USA. - **Chirocentridae, Clupeidae, Engraulidae, Pristigasteridae.**
- Norman, M.D., Department of Zoology, University of Melbourne, Parkville, Vic 3052, Australia. - **Cephalopods (Octopodidae, Sepiadiariidae, Sepiolidae).**
- Olney, J.E., Virginia Institute of Marine Science, College of William and Mary, Gloucester Point, VA 23062, USA. - **Lamprididae, Lophotidae, Radiicephalidae, Regalecidae, Stylephoridae, Trachipteridae, Veliferidae.**
- Palsson, W.A., Washington Department of Fish and Wildlife, 16018 Mill Creek Boulevard, Mill Creek, WA 98012-1296, USA. - **Pegasidae.**
- Parenti, L.R., Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA. - **Adrianichthyidae, Aplocheilidae, Phallostethidae, Poeciliidae.**

- Parin, N.V., P.P. Shirshof Institute of Oceanology, Russian Academy of Sciences, 117851 Pr. Nakhimova 36, Moscow, Russia. - **Exocoetidae, Gempylidae, Scombrolabracidae, Trichiuridae.**
- Paxton, J.R., Fish Section, Australian Museum, 6 College St., Sydney, NSW 2000, Australia. - **Hagfishes, Alepisauridae, Anomalopidae, Anoplogastridae, Anotopteridae, Argentinidae, Aulopidae, Barbouriidae, Bathyclupeidae, Bathylagidae, Berycidae, Caristiidae, Cetomimidae, Chiasmodontidae, Chlorophthalmidae, Diretmidae, Evermannellidae, Gibberichthyidae, Giganturidae, Ipnopidae, Megalomycteridae, Melamphaidae, Microstomatidae, Mirapinnidae, Monocentridae, Myctophidae, Neoscopelidae, Notosudidae, Omosudidae, Opisthoproctidae, Paralepididae, Polymixiidae, Rondeletiidae, Scopelarchidae, Trachichthyidae.**
- Paulus, T., DVWK - GFG, Gemeinnützige Fortbildungsgesellschaft für Gewässerpflege mbH, Frauenlobplatz 2, D-55118 Mainz, Germany. - **Syngnathidae.**
- Pietsch, T.W., School of Fisheries, 1140 Boat Street, University of Washington, Box 355100, Seattle, WA 98195-5100, USA. - **Antennariidae, Caulophryniidae, Centrophryniidae, Ceratiidae, Diceratiidae, Gigantactinidae, Himantolophidae, Linophryniidae, Lophichthyidae, Melanocetidae, Neoceratiidae, Oneirodidae, Tetrabrachiidae, Thaumichthyidae.**
- Poss, S.G., Gulf Coast Research Laboratory, P.O. Box 7000, Ocean Springs, MS 39566-7000, USA. - **Aploactinidae, Bembridae, Caracanthidae, Dactylopteridae, Scorpaenidae.**
- Poutiers, J.M., Laboratoire de Biologie des Invertébrés Marins et Malacologie, Muséum National d'Histoire Naturelle, Ura 699 - CNRS, 55, Rue Buffon, 7500, Paris, France. - **Bivalves, gastropods.**
- Premcharoen, S., Faculty of Liberal Arts and Science, Kasetsart University, Kamphaengsaen Campus, Nakorn Pathom 73140, Thailand. - **Leiognathidae.**
- Pyle, R.L., Ichthyology, B.P. Bishop Museum, 1525 Bernice Street, Honolulu, HI 96817-0916, USA. - **Chaetodontidae, Pomacanthidae.**
- Randall, J.E., 45-1033 Pahuwai Pl., Kaneohe, HI 96744, USA. - **Acanthuridae, Albulidae, Cheilodactylidae, Cirrhitidae, Holocentridae, Mullidae, Pinguipedidae, Serranidae, Zanclidae.**
- Rasmussen, A.R., Zoologisk Museum, Universitetsparken 15, DK-2100 Copenhagen, Denmark. - **Sea snakes.**
- Reid, A.L., Museum of Victoria, Natural Sciences, Invertebrate Zoology, 328 Swanston St. Melbourne, Australia 3000, Australia. - **Cephalopods (Sepiadariidae, Sepiidae, Sepiolidae).**
- Richards, W.J., Southeast Fisheries Science Center, NOAA, 75 Virginia Beach Drive, Miami, FL 33149, USA. - **Triglidae.**
- Rosenzweig, P.A., Wildlife Management International Pty. Ltd., P.O. Box 530, Sanderson, Nt 0812, Australia. - **Estuarine crocodiles.**
- Russell, B.C., Museums and Art Galleries of the Northern Territory, P.O. Box 4646, Darwin, NT 0801, Australia. - **Bathysauridae, Nemipteridae, Synodontidae.**
- Sakai, K., Nature Conservation Division, Environment Department, Ishikawa Prefectural Government, 2-1-1 Hirosaka, Kanazawa 920, Japan. - **Kyphosidae.**
- Sasaki, K., Department of Biology, Faculty of Science, Kochi University, Akebono, Kochi 780, Japan. - **Sciaenidae.**
- Sazonov, Y.I., Zoological Museum, Moscow State University, Herzen St 6, Moscow K-9, Russia 103009. - **Alepocephalidae, Platytroctidae.**
- Senou, H., Kanagawa Prefectural Museum, Naku-ku, Yokohama, Kanagawa 231, Japan. - **Mugilidae, Sphyrnaeidae.**
- Smith, D.G., Division of Fishes, National Museum of Natural History, Washington, DC 20560, USA. - **Albulidae, Anguillidae, Chlopsidae, Colocongridae, Congridae, Cyematidae, Derichthyidae, Elopidae, Eurypharyngidae, Halosauridae, Lipogenidae, Megalopidae, Monognathidae, Moringuidae, Muraenesocidae, Muraenidae, Myrocongridae, Nemichthyidae, Nettastomidae, Notacanthidae, Ophichthidae, Saccopharyngidae, Serrivomeridae, Synaphobranchidae.**
- Smith-Vaniz, W.F., U.S. Geological Survey, Biological Resources Division, 7920 NW 71st Street, Gainesville, FL 32653-3071, USA. - **Carangidae, Cepolidae, Opisthognathidae.**
- Springer, V.G., Museum of Natural History, MRC 159 Washington, DC 20560, USA. - **Blenniidae, Pholidichthyidae.**
- Starnes, W.C., North Carolina State Museum of Natural Sciences, P.O. Box 29555, Raleigh, NC 27626, USA. - **Priacanthidae.**
- Thiesfeld, K.G., Department of Fisheries, Humboldt State University, Arcata, California 95521, USA. - **Aulostomidae, Centriscidae, Fistulariidae, Macrorhamphosidae, Solenostomidae.**
- Trono, G.C., Jr., Marine Science Institute, University of the Philippines, U.P. P.O. Box 1, Diliman, 1101 Quezon City, Philippines. - **Seaweeds.**
- Vari, R.P., Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA. - **Terapontidae.**
- Westneat, M.W., Department of Zoology, Field Museum of Natural History, Roosevelt Rd at Lakeshore, Chicago, IL 60605, USA. - **Labridae.**
- Williams, J.T., Division of Fishes, National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA. - **Tripterygiidae.**
- Wongratana, T., Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand. - **Chirocentridae, Clupeidae, Engraulidae, Pristigasteridae.**
- Woodland, D., Zoology Department, University of New England, Armidale NSW 2351, Australia. - **Gerreidae, Leiognathidae, Menidae, Siganidae.**